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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/642,655	08/22/2000	Edward Brittain Stokes	040849/0143	9163

22428 7590 10/21/2003

FOLEY AND LARDNER
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3000 K STREET NW
WASHINGTON, DC 20007

EXAMINER

ZIMMERMAN, GLENN

ART UNIT	PAPER NUMBER
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2879

DATE MAILED: 10/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	09/642,655		STOKES ET AL.	
	Examiner		Art Unit	
	Glenn Zimmerman		2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-16, 18-39, 41 and 42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2-6, 8-13, 16, 18-20, 25-39 and 42 is/are allowed.
- 6) ☒ Claim(s) 7, 14, 21-24 and 41 is/are rejected.
- 7) ☒ Claim(s) 15 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>0803</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

Amendment, filed on July 9, 2003, has been entered and acknowledged by the examiner.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 7, 14, 21-24 and 41 are rejected under 35 U.S.C. 102(b) as being anticipated by Reeh et al. WO 97/50132.

Claims 7, 14, 21-24 and 41 are rejected under 35 U.S.C. 102(e) as being anticipated by Reeh et al. U.S. Patent 6,576,930.

Note that Reeh et al. U.S. Patent 6,576,930 is based on Reeh et al. PCT/DE97/01337 i.e. WO 97/50132 through continuation of application, and the latter is in German and the former in English. Therefore, the English language U.S. Patent is used below as an interpretation of the German language PCT WO publication, since

both Publications write about the same invention. This allows for a 102(b) rejection based on the WO 97/50132 Patent Application and also a 102(e) rejection based on the U.S. Patent 6,576,930.

Regarding claim 7, Reeh et al. discloses a light emitting device, comprising:

A radiation source (**semiconductor body Fig. 2 ref 1**);

A luminescent material (**col. 6 lines 3-9**); and

A radiation scattering material located between the radiation source and the luminescent material (**col. 7 lines 38-45**);

Wherein:

The radiation scattering material comprises radiation scattering particles located separately from the luminescent material (**col. 7 lines 41-43; col. 14 lines 44-47**);

The radiation source comprises a light emitting diode or a laser diode emitting radiation having a first peak emission wavelength (**Fig. 7; col. 14 lines 51-58; col. 5 lines 20-31**); and the luminescent material comprises an organic dye (**col. 6 lines 3-9**) which emits radiation having a second peak wavelength in response to incident radiation source radiation (**col. 6 lines 66-67; col. 7 lines 1-12**).

Regarding claim 14, Reeh et al. discloses a light emitting device, comprising:

A radiation source (**semiconductor body ref. 1**);

A luminescent material (**luminescent material ref. 6 ; luminescent conversion layer ref. 4 ; col. 7 lines 47-66 ; col. 8 lines 1-7**);

A radiation scattering material located between the radiation source and the luminescent material (**col. 7 lines 38-45; col. 14 lines 44-47**); and

A package supporting (**reflector part ref. 16**) the radiation source

Wherein:

The radiation scattering material comprises radiation scattering particles located separately from the luminescent material (**col. 14 lines 40-50**);

The radiation source comprises a light emitting diode emitting radiation having a first peak emission wavelength (**Fig. 7; col. 7 lines 38-45; col. 14 lines 44-77**);

The luminescent material comprises a phosphor which emits radiation having a second peak wavelength in response to incident radiation source radiation (**col. 8 line 55-62; YAG:Ce**) ;

The radiation scattering material comprises the radiation scattering particles located in a carrier medium comprising a transmissive body and a light or UV radiation scattering particle layer located on sidewalls (**transparent encapsulation ref. 15**) of a reflector cup portion (**ref. 16**) of the package containing the light emitting diode; and the radiation scattering particles in the carrier medium are located above the light emitting diode and the luminescent material is located above the radiation scattering particles in the carrier medium (**Fig. 4**).

Regarding claim 21, Reeh et al. discloses a white light emitting device, comprising:

A package containing a reflector cup (**reflector part Fig. 4 ref. 16**);

A light emitting diode (**semiconductor body ref. 1**) in the reflector cup;

Radiation scattering particles in a packed layer or in a carrier medium over the light emitting diode (**col. 7 lines 38-45; col. 14 lines 44-47**); and

A phosphor or an organic dye (**luminescent conversion layer ref. 4; luminescent material ref. 6; col. 7 lines 47-66; col. 8 lines 1-7**) which emits radiation having a second peak wavelength in response to incident light emitting diode radiation having a first peak wavelength, such that the device output appears white to an observer (**abstract**);

Wherein the phosphor or organic dye is located over and separately from the radiation scattering particles located in the packed layer or in the carrier medium and the phosphor or organic dye comprises a layer which does not contain radiation scattering particles (**col. 14 lines 44-47**).

Regarding claim 22, Reeh et al. discloses the device of claim 21, wherein: the light emitting diode comprises a blue or an ultraviolet light emitting diode (**col. 2 lines 42-48**); the radiation scattering particles comprise light or UV radiation scattering particles in a carrier medium (**col. 14 lines 46-50**); and the phosphor or the organic dye comprises a yellow or white light emitting phosphor layer or a dispersion of a phosphor in an epoxy (**col. 8 line 55-62; YAG:Ce**) or silicone.

Regarding claim 23, Reeh et al. discloses the device of claim 22, wherein the light emitting diode comprises a light emitting diode having an emission wavelength of 365 to 420 nm (**Fig. 7; col. 11 lines 25-38**); and i) a white light emitting phosphor layer comprising one or more phosphors; or ii) a dispersion of at least one phosphor and an epoxy (**col. 8 line 55-62; YAG:Ce**) or silicone.

Regarding claim 24, Reeh et al. discloses the device of claim 22, wherein the light emitting diode comprises a blue emitting InGaN light emitting diode (**col. 5 lines**

25-30) and the phosphor or the organic dye comprises a dispersion of an epoxy or silicon and a YAG:Ce³⁺ (**col. 8 line 55-62; YAG:Ce**).

Regarding claim 41, Reeh et al. discloses the light emitting device of claim 21, wherein the radiation scattering particles in the packed layer or in the carrier medium are located separately from the phosphor or organic dye (**col. 14 lines 40-50**).

Allowable Subject Matter

Claims 2-6, 8-13, 16, 18-20, 25-39 and 42 are allowed.

Claim 15 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 2, the following is an examiner's statement of reasons for allowance: The prior art of record neither shows nor suggests a light emitting device including the combination of all the limitations as set forth in claim 2, and specifically the radiation scattering material comprises radiation scattering particles located separately from the luminescent material, a mean diameter of the radiation scattering particles is between $\lambda/3$ and $\lambda/2$, where λ is a first peak emission wavelength of the radiation source; the radiation source comprises a light emitting diode or a laser diode emitting radiation having the first peak emission wavelength could not be found elsewhere in prior art.

Regarding claims 3-6, 8-13, 18-20 and 39, claims 3-6, 8-13, 18-20 and 39 are allowed for the reasons given in claim 2, because of their dependency status on claim 2.

Regarding claim 15, the following is an examiner's statement of reasons for allowance: The prior art of record neither shows nor suggests a device including the combination of all the limitations as set forth in claim 15, and specifically wherein the radiation scattering material comprises all three of: a) at least one light or UV radiation scattering particle layer in a glass passivation layer directly over the light emitting diode; b) light or UV radiation scattering particles in a silicone layer over the light emitting diode or over and on sides of the light emitting diode; and c) the light or UV radiation scattering particle layer on the sidewalls of the reflector cup portion of the package containing the light emitting diode could not be found elsewhere in prior art.

Regarding claim 16, the following is an examiner's statement of reasons for allowance: The prior art of record neither shows nor suggests a light emitting device including the combination of all the limitations as set forth in claim 16, and specifically the radiation scattering particles are located in a carrier medium comprising a transmissive body and the radiation scattering particles comprise at least two layers of TiO_2 particles in about a 1 micron to about a 2 micron thick silica layer arranged to achieve photonic crystal effects could not be found elsewhere in prior art.

Regarding claim 25, the following is an examiner's statement of reasons for allowance: The prior art of record neither shows nor suggests a white light emitting device including the combination of all the limitations as set forth in claim 25, and specifically the phosphor is located over and separately from the radiation scattering

particles located in the carrier medium, the light emitting diode comprises a blue or an ultraviolet light emitting diode the phosphor comprises a yellow or white light emitting phosphor layer or a dispersion of a phosphor in an epoxy or silicon and the radiation scattering particles are selected from a group consisting of TiO_2 , BaTiO_3 , Al_2O_3 , SiO_2 , CaCO_3 , BaSO_4 , and diamond particles having a mean diameter of 50 to 500 nm could not be found elsewhere in prior art.

Regarding claims 26-30, claims 26-30 are allowed for the reasons given in claim 25, because of their dependency status on claim 25.

Regarding claim 31, the following is an examiner's statement of reasons for allowance: The prior art of record neither shows nor suggests a white light emitting device including the combination of all the limitations as set forth in claim 31, and specifically a mean diameter of the radiation scattering particles is between $\lambda/3$ and $\lambda/2$, where λ is the peak emission wavelength of the radiation source along with the radiation scattering particles scatter at least 50% more radiation source radiation than luminescent material radiation could not be found elsewhere in prior art.

Regarding claim 32, the following is an examiner's statement of reasons for allowance: The prior art of record neither shows nor suggests a method of generating white light from a light emitting device including the combination of all the limitations as set forth in claim 32, and specifically a mean diameter of the radiation scattering particles is between $\lambda/3$ and $\lambda/2$, where λ is a first peak emission wavelength of the radiation source could not be found elsewhere in prior art.

Regarding claims 33-35, claims 33-35 are allowed for the reasons given in claim 32, because of their dependency status on claim 32.

Regarding claim 36, the following is an examiner's statement of reasons for allowance: The prior art of record neither shows nor suggests a light emitting device including the combination of all the limitations as set forth in claim 36, and specifically a luminescent material layer which does not substantially exhibit Mie scattering; and a radiation scattering phosphor layer, which exhibits Mie scattering of the radiation source radiation, located between the radiation source and the luminescent material could not be found elsewhere in prior art.

Regarding claims 37, 38 and 42, claims 37, 38 and 42 are allowed for the reasons given in claim 36, because of their dependency status on claim 36.

Response to Arguments

Applicant's arguments with respect to claims 21-24 and 42 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Glenn Zimmerman whose telephone number is (703) 308-8991. The examiner can normally be reached on M-F.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (703) 305-4794. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is n/a.



Glenn D. Zimmerman

Joseph Williams
Joseph Williams